The northward migration seems to have been quite general. They made their first appearance in the vicinity of Kansas City early in September, and by September 26–30 were present in countless swarms at Kansas City and Holden. They reached Macon in north Missouri September 24, and were very abundant and troublesome until frost. Here at Columbia they were especially abundant the last two weeks of September and early October; while later in October the moth of the army worm (*Leucania unipunctata*) was far more abundant, collecting about cider mills and injured and decaying fruit. With conditions favorable next year, we may expect considerable injury from the army worm in this state.

One point with reference to the moth of the cotton worm which the other notes have not brought out, is the injury which they do to ripening fruit in the orchard and where fruit is exposed in the market. This has been especially emphasized in all the letters received at this office this fall. As is well known, this moth has rudimentary mandibles by means of which it can break the skin of fruit and then with its proboscis it sucks out the juices. Late peaches, especially Heath Clings, are reported as having been severely injured this year. In some cases a dozen or more at a time collect on a single peach and eventually all the juice is consumed, leaving only the skin, pulp and pit. Grapes and even bananas in the market are attacked. In the orchard, after the peaches were picked, the moths turned to the apples. Their attack on the apple is similar to that on the peach except that the juice is drawn out in patches which turn brown and become mellow like bruises. The affected patches vary from the size of a pea to that of a dime or a quarter. The most of the fruit so attacked decays.

The strange northward migration of this moth which has always been of considerable interest to the entomologist has proved to be of special interest to many of the Missouri fruit growers this year.

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Crystallographic Tables

To the Editor of Science: As a teacher of crystallography I have found that students rarely appreciate the full significance of the fundamental laws of the science until, by actual measurement and calculation, they have found concrete evidence. With large crystals of quartz, calcite, tourmaline, zircon, rutile, barite, staurolite and a number of others, satisfactory results may be obtained by use of the Penfield hand goniometer. The advantage of such crystal measurement is twofold; it illustrates the laws which govern the arrangement of crystal planes, and it teaches the value of the science as a means of mineral determination.

Regarding the latter phase of the study, students are taught the methods of measurement and calculation necessary in each system for the determination of axial ratios. To bring out clearly the real value of such calculations as a means of practical mineral determination some sort of reference table of axial ratios seems desirable. Such tables have been compiled in a somewhat imperfect form, and it is to these that attention is directed.

The axial ratios of common tetragonal and hexagonal minerals are arranged in ascending values of c, the mineral names being placed in a parallel column. In practise the chart is placed before a class with the mineral names covered. After careful measurement and calculation the student refers to the column of ratios, and the fact that he can, in many cases, determine the mineral properly by this means alone, makes it a most illuminating and interesting exercise.

The orthorhombic system presents considerable difficulty in compiling a table of ratios since there are three possible ways in which the values of a, b and c may be arranged and still be in accord with the convention that b must be greater than a. Having determined the axial ratios, one is in doubt as to the proper arrangement. The three possible values of a, which may occur, b being unity, are the value of a when (1) c is greater than a and also greater than b; (2) c is greater than a and less than b; (3) c is less than a

and less than b. The most useful table, one which precludes the necessity of rearrangement or recalculation, is one which includes all three of these possible values. For the most common orthorhombic minerals such a table has been arranged with the values of a in increasing order of magnitude, the corresponding values of c and the mineral names being placed in parallel columns. Thus each mineral appears three times, and the value of a accepted by convention is underlined. The corresponding value of c in the parallel column is a very useful check in tracing the unknown mineral.

If a monoclinic mineral is held with the greatest possible number of faces vertical, the most probable mistake in orientation is the interchange of a and c axes. Hence the table is made to include both a and c as possible values of a, *i. e.*, each mineral appearing twice in the table.

Would such tables, enlarged to include all minerals for which axial ratios have been determined, be useful accessories in the work of crystallographic mineral determination with the reflecting goniometer? Would tables further enlarged to include artificial crystals be of use to the chemical crystallographer?

Before undertaking such a task one wishes to know if it is worth while, and for this reason the questions are presented. Suggestions, and the utmost freedom of criticism by teachers of crystallography, are invited.

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HOUSE AIR

TO THE EDITOR OF SCIENCE: I had occasion recently to consult the issue of SCIENCE for September 29, 1911, and read for the first time the letter on "House Air" from Professor J. Y. Bergen, of Cambridge.

He makes this statement regarding the ventilation obtained from a hot air register:

> The ventilation . . . is much better than can be obtained in summer by opening a single window to its full height.

It is doubtless known to him and should be more widely known that it is better to pull the window down a couple of inches from the top and up from the bottom when ventilation is required than to open either half only. The truth of this statement can easily be tested by holding a lighted candle at the window openings.

G. L. MANNING
ROBERT COLLEGE,
January 23, 1912

QUOTATIONS

MOST RECENT INVESTIGATIONS ON THE DETERMINATION, PRESERVATIVE ACTION AND ADMISSIBILITY OF THE USE OF BENZOIC ACID[1]

PART II[2]

I NOW come to the most important part of my work—a critical summary of the three detailed investigations on the effect of benzoic acid and of benzoates on man which have been carried out during the last four years and which now furnish us that broad basis, which I have always desired, necessary for the formation of an intelligent opinion. First, there are two great works from the American Department of Agriculture; one carried out by H. W. Wiley,[3] in 1908, the other by a commission, under the chairmanship of the distinguished chemist, Ira Remsen, consisting of the three well-known American scientists, Professor Russell H. Chittenden, of Yale University; Professor John H. Long, of Northwestern University, and Professor Christian A. Herter, of Columbia University, New York. It seems strange that a great government should publish two books, one right after the other, dealing with the same subject-matter; and we seek in vain, in the second large volume of 761 pages, for a word of explanation of this surprising fact. Wiley's work is simply ig-

[1] Translated from the *Chemiker-Zeitung*, Cöthen, November 28, 1911, pp. 1314–17.

[2] Part I. (*Chem. Ztg.*, 1911, pp. 1297–99) is a summary of the articles dealing with the isolation, qualitative and quantitative determination, natural occurrence in plants, preservative action, use and toxic effects of benzoic acid.

[3] *J. Soc. Chem. Ind.*, 28, 67 (1909).